

MTH 310: HW 1

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Due: May 23, 2018

Problems from Hungerford's book (3rd ed.) are labeled by **Hungerford chpt.sec.#.**

- (Hungerford 1.1.2)** Find the quotient q and remainder r when a is divided by b .
 - $a = -51; b = 6$
 - $a = 302; b = 19$
 - $a = 2000; b = 17$
- (Hungerford 1.1.7)** Use the Division Algorithm to prove that the square of any integer a is either of the form $3k$ or of the form $3k + 1$ for some integer k .
- (Hungerford 1.1.10)** Let n be a positive integer. Prove that a and c leave the same remainder when divided by n if and only if $a - c = nk$ for some integer k .
- (Hungerford 1.2.9)** If $a|c$ and $b|c$, must $ab|c$? Justify your answer.
- (Hungerford 1.2.11)** If $n \in \mathbb{Z}$, what are the possible values of
 - $(n, n + 2)$
 - $(n, n + 6)$
- Prove that if k is a positive odd integers, then any sum of k consecutive integers is divisible by k .
- (Hungerford 1.2.20)** Prove that $(a, b) = (a, b + at)$ for every $t \in \mathbb{Z}$.
- (Hungerford 1.2.28)** Prove that a positive integer is divisible by 3 if and only if the sum of its digits is divisible by 3. [*Hint*: $10^3 = 999 + 1$ and similarly for other powers of 10.]
- (Hungerford 1.2.34)** Prove that
 - $(a, b)|(a + b, a - b)$;
 - if a is odd and b is even, then $(a, b) = (a + b, a - b)$.